

PATENT SPECIFICATION

(11)

1 222 961

1222961

DRAWINGS ATTACHED

- (21) Application No. 2028/67 (22) Filed 13 Jan. 1967
 (23) Complete Specification filed 8 Jan. 1968
 (45) Complete Specification published 17 Feb. 1971
 (51) International Classification B 26 f 1/04
 (52) Index at acceptance
 B4B 13B1 13B2 13X3 16F 16G4 16G7



(54) IMPROVEMENTS IN OR RELATING TO APPARATUS FOR SELECTIVELY RECIPROCATING A NUMBER OF TOOLS TO FORM A PATTERN

(71) We, ASSOCIATED PERFORATORS AND WEAVERS LIMITED, a British Company, of Howard House, 4 Arundel Street, London, W.C.2, and JAMES KENNETH KIRBY, a British Subject, of 125 Bastion Road, Abbey Wood, London, C.E.2, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to apparatus for selectively reciprocating a number of tools for forming a pattern, and particularly for punching holes in sheet material at predetermined locations.

The invention provides apparatus for selectively reciprocating a number of tools for forming a pattern on a work-piece placed in a press opposite said tools, which apparatus comprises a tool holder, a set of tools slidably mounted in said holder, pattern selecting means including abutment means and being movable so that the abutment means may abut only selected tools, the selecting means being movable by a press member to move only the selected tools towards the work-piece, in which the pattern selecting means comprises a number of rectilinearly movable slides; the abutment means engages an end of the selected tools which extends from the tool holder and the pattern selecting means includes a recess adjacent the abutment means, said pattern selecting means being movable so as to bring the recess into or out of register with the end of a tool or tools so that the tool or tools become inoperative or operative on the work-piece when the press member and tool holder contact with one another under the action of the press; a stripper plate disposed on the opposite side of the tool holder to the press member so as to be engageable with the work-piece, said stripper plate being provided with holes through which the selected tools may be projected into the work-piece and a compressed block of elastomeric

material disposed between the tool holder and stripper plate and wherein said tools are provided with enlargements at those ends which are engageable by the pattern selecting means and overlie faces or shoulders on the tool holder which are directed towards the press member whereby, after the tools have passed through the stripper plate into the work-piece and the compressed block has been further compressed, the stripper plate and the tool holder are forced apart by the compressed block, which tool holder, in engaging the head of the tools, withdraws them from the work-piece; and in which means are provided for limiting the separating movement between the press member and tool holder and elastic means are provided for effecting such separating movement so as to form a gap of predetermined width.

According to a feature of the invention the various parts are arranged so that after the tools have been withdrawn from the work-piece, further separation of the press member and the tool holder is provided by the said elastic means.

According to another feature the means for limiting the separating movement between the press member and the tool holder is detachable or adjustable so as to enable the press member to be removed to enable fresh pattern selecting means to be assembled. There may be a programme arranged periodically to set the pattern selecting means in accordance with the pattern to be produced by the selected tools.

Preferably the tools comprise punches which are arranged to cooperate with die plates disposed opposite them. The tools may be arranged in one or more rows in the tool holder and the slides may be movable in directions transverse to the length of the rows so that the abutment means only abuts selected tools.

The following is a description of a punch assemblage for use in a press and which is disposed above a die plate with which the

[Price 25p]

punches cooperate reference being made to the drawings accompanying the provisional specification in which:—

5 Figure 1 is a plan view of the punch assemblage;

Figure 2 is a section on the cranked line 2—2 of Figure 1;

Figure 3 is a side view of the assemblage looking from the left of Figure 2;

10 Figure 4 is a similar view of Figure 3 and showing part of the assemblage which controls the pattern produced by the punches;

Figure 5 is a diagrammatic layout of the apparatus.

15 Referring now to Figures 1 and 2, two rows 10 and 11 of punches are reciprocal in staggered relationship in a punch holder 12. The punch holder is secured to a stripper plate 13 by means of screws 14, the threaded
20 ends of the screws engaging said holes in the stripper plate and the heads 15 of the screws being countersunk in holes 16 in the punch holder. The screws serve to compress a block of rubber 17 disposed between
25 the punch holder and stripper plate. The shanks of the punches extend through holes in the punch holder and in the rubber block and in the stripper plate and are provided with circumferential grooves 18 which
30 accommodate spring rings 19 which form stops for limiting the upward movement of the punches in relation to the punch holder.

The punches are provided with enlarged heads 20 which is in the position of the parts
35 shown in Figure 2 are disposed in countersunk holes 21 in the punch holder.

40 Disposed above the punch holder is a punch pad 22 in the underside of which is cut a channel 23 in which are located side by side a number of slides 24 which are retained in position by retaining strips 25 secured in the underside of the pad and across the channel as best seen in Figure 3.

45 The punch pad 22 is provided with two holes 26 indicated by the dotted lines in Figure 1 and one of which is shown to the right of Figure 2.

50 Disposed above the pad is a rectangular adaptor plate 27 provided with four holes 28 through which downwardly extend screws 29 and the lower ends of which engage threaded holes in the retaining strips 25.

55 The adaptor plate 27 and the punch holder are each provided with two registering holes 30 in which are mounted posts 31 and which posts pass loosely through the aforesaid holes 26 in the punch pad 22.

60 Within these latter holes the posts are encircled by helical compression springs 32 which at one end abut recesses formed in the underface of the adaptor plate and at the other end recesses in the upper face of the punch holder. There are thus provided two
65 relatively vertically movable units one unit made up of the stripper plate 13, rubber

block 17, punch holder 12 and punches 10 and the other unit made up of the punch pad 23, slides 24, retaining strips 25 and adaptor plate 27, which vertical movement is constrained by the posts 31.

70 The extent to which these units can be separated represented by the gap indicated at 33 is limited by claws 34, one end of each claw extending between lugs 35 (see Figure 3) at the end of the punch holder, which lugs and the end of the claw are provided with holes through which pass a pivot pin 36, one end of the pivot pin being provided with a head 37 and the other being
80 slotted at 38 (as best seen in Figure 1) in which slot is pivoted a keep 39. The other end of the claw is provided with a nose 40 (Figure 2) which overlies the punch pad 22.

85 The claw is provided with an elongated slot 41 (Figure 3) and extending through this slot is a screw 42 which engages a threaded hole in the punch pad and the head 43 of the screw loosely engages the outer face of the claw. The stripper plate 13 is provided with
90 holes for two locating pins 45 provided with heads 46 on the upper side of the stripper plate and between which heads and recesses under the side of the punch plate are located helical compression springs 47. The under-
95 side of each slide 24 has cut in it a cross slot 48 as indicated in each of Figures 1 to 3.

Each slide is individually adjustable so as to bring the slot into or out of register with the heads of the two sets of punches in that
100 slide, thereby enabling a required pattern of the holes to be punched in the work. For this purpose each slide at one end is formed with a tongue 49 (see Figure 1) having a hole 50 therein to which is attached a Bowden cable
105 60 to sheath 61 of which is accommodated in a hole 51 in a plate 52 secured by screws 53 to one end of the punch pad 22. The other end of each slide 24 is forked at 54 and an anchor pin 55 extends across the limbs of the fork and is engaged by one end of a tension
110 spring 56, the other end of which spring extends through a hole in a cable plate 57 secured by a screw 58 to the other end of the plunger pad.

115 A loop at the end of the spring is engaged by a pin 59 which extends across the hole in the plate.

120 Each cable 60 is secured to one of a number of plungers 62 reciprocable in cylinders 63 which are brought into or out of communication with a source 64 of compressed air by valve mechanisms 65 controlled by
125 pneumatic responsive means conditioned by a punched tape 66 which constitutes the aforesaid programme.

The mode of operation of the punches is as follows:—

Initially the parts are in the position shown 130

in Figure 2 with the lower ends of the punches within the stripper plate. The punch assemblage is placed between the platens of a press with the locating pins 45 immediately above holes in the die plate. The platens of the press are then brought together and the first part of the movement will cause the upper unit to move bodily downwards towards the lower unit bringing the underface of the punched pad 22 into engagement with the upper face of the punch holder; the slides will be immediately above the heads of the punches and the punch pad will have moved downwardly from the overlying portions of the claws 34.

Continued movement downwardly causes the ends of the punches to punch the work whereas those heads which are opposite slots 48 will pass into the slots without effecting punching.

The springs 32 will have been compressed and when the platens of the press are again separated, the stripper plate will remain in contact with the work during the first part of the movement whereafter the upward movement of the punch holder under the action of the rubber block will draw those heads, which are in contact with it, upwardly, withdrawing the punches from the work and up through the stripper plate.

The springs 32 will have moved the punch pad 22 into engagement with the claws re-establishing the gap 33. At this stage the slides will have been moved to bring all the slots clear of the heads of the plungers so that further upward movement under the action of the rubber block will cause those heads which were projecting upwardly from the punch holder to be forced downwardly flush with it. The work is then fed one step forward over the die plate and the next set of holes will be punched according to which of the slides have been operated.

WHAT WE CLAIM IS:—

1. Apparatus for selectively reciprocating a number of tools for forming a pattern on a work-piece placed in a press opposite said tools, which apparatus comprises a tool holder a set of tools slidably mounted in said holder, pattern selecting means including abutment means and being movable so that the abutment means may abut only selected tools, the selecting means being movable by a press member to move only the selected tools towards the work-piece, in which the pattern selecting means comprises a number of rectilinearly movable slides; the abutment means engages an end of the selected tools which extends from the tool holder, and the pattern selecting means includes a recess adjacent the abutment means, said pattern selecting means being movable so as to bring the recess into or out of register with the end of a tool or

tools so that the tool or tools become in-operative or operative on the work-piece when the press member and tool holder contact with one another under the action of the press; a stripper plate disposed on the opposite side of the tool holder to the press member so as to be engageable with the work-piece, said stripper plate being provided with holes through which the selected tools may be projected into the work-piece, and a compressed block of elastomeric material disposed between the tool holder and stripper plate and wherein said tools are provided with enlargements at those ends which are engageable by the pattern selecting means and overlie faces or shoulders on the tool holder which are directed towards the press member whereby, after the tools have passed through the stripper plate into the work-piece, and the compressed block has been further compressed, the stripper plate and the tool holder are forced apart by the compressed block, which tool holder, in engaging the head of the tools, withdraws them from the work-piece; and in which means are provided for limiting the separating movement between the press member and tool holder and elastic means are provided for effecting such separating movement so as to form a gap of predetermined width.

2. Apparatus as claimed in claim 1 in which the various parts are arranged so that after the tools have been withdrawn from the work-piece, further separation of the press member and the tool holder is provided by the said elastic means.

3. Apparatus as claimed in claim 1 or claim 2 in which the means for limiting the separating movement between the press member and the tool holder is detachable or adjustable so as to enable the press member to be removed to enable fresh pattern selecting means to be assembled.

4. Apparatus as claimed in any one of claims 1 to 3 in which a programme is arranged periodically to set the pattern selecting means in accordance with the pattern to be produced by the selected tools.

5. Apparatus as claimed in any one of claims 1 to 4 in which the tools comprise punches which are arranged to cooperate with die plates disposed opposite them.

6. Apparatus as claimed in any one of claims 1 to 5 in which the tools are arranged in one or more rows in the tool holder and the slides are movable in directions transverse to the length of the rows so that the abutment means only abuts selected tools.

7. Apparatus as claimed in any one of claims 1 to 6 in which the recesses extend across the pattern selecting means adjacent an end of one or more tools in a row of tools.

8. Apparatus for selectively reciprocating a number of tools for forming a pattern on

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a work-piece placed in the press opposite
said tools, substantially as hereinbefore des-
cribed with reference to and as illustrated in
the drawings accompanying the provisional
5 specification.

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Chartered Patent Agents,
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Printed for Her Majesty's Stationery Office, by the Courier Press, Leamington Spa, 1971.
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from
which copies may be obtained.

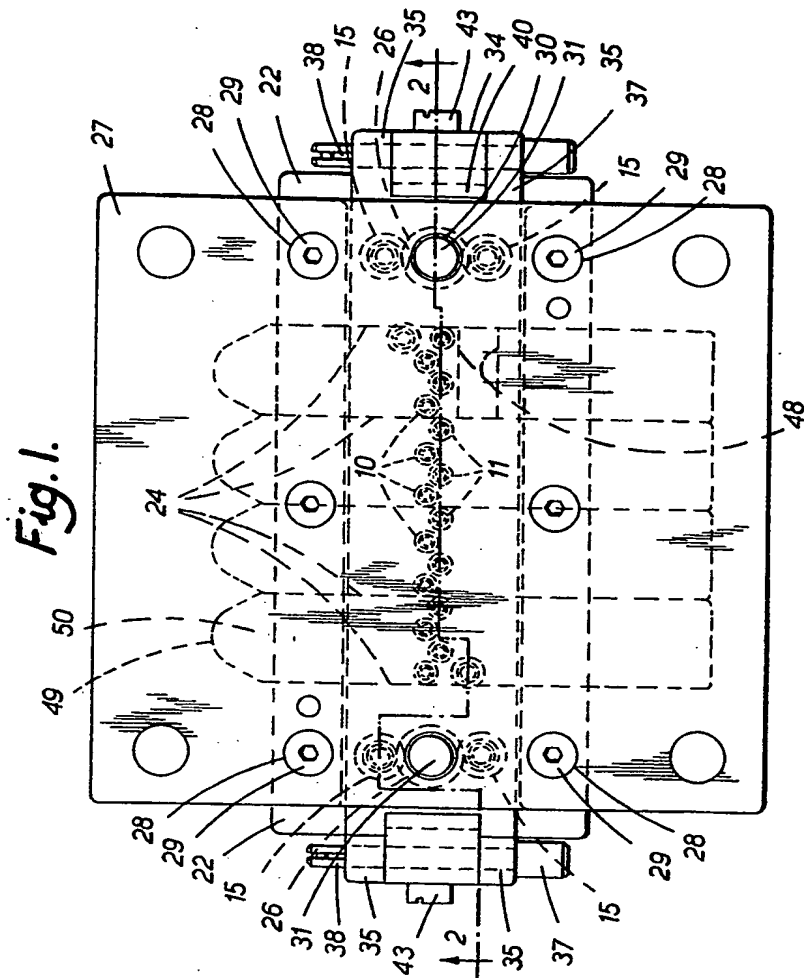


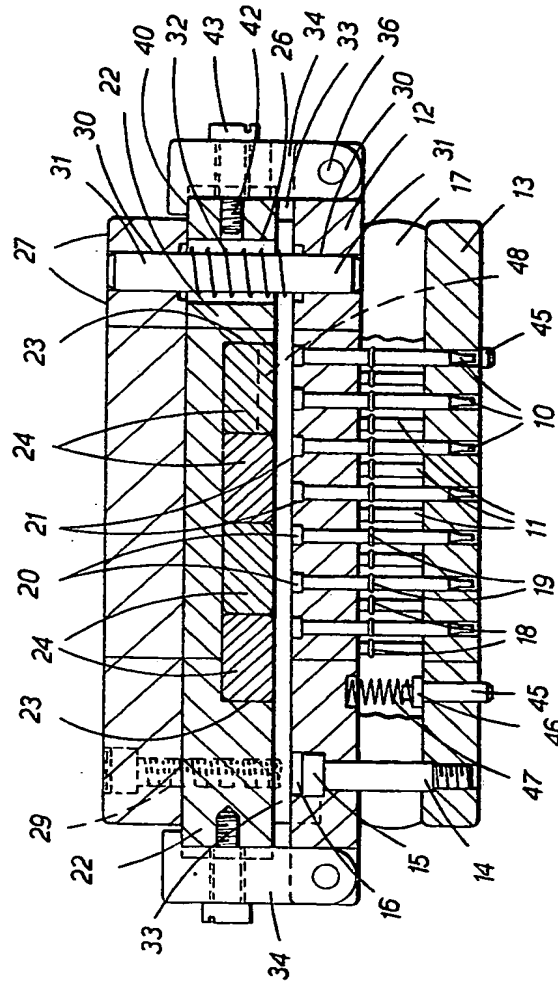
Fig. 2

Fig. 3.

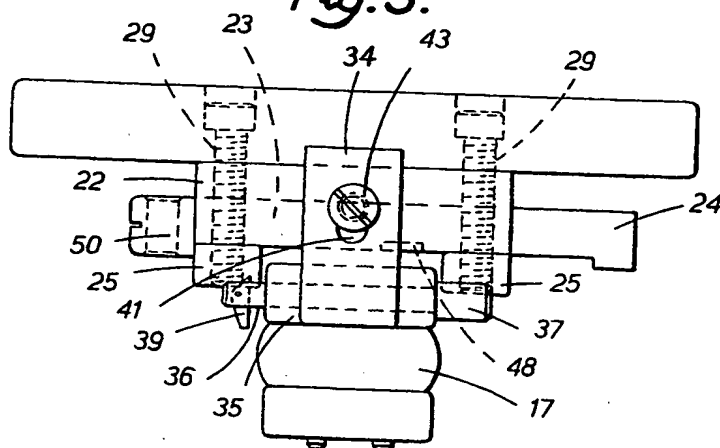


Fig. 4.

